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University of Toronto

COMPUTER SCIENCE NEWSLETTER

No. 87

Edited by C. A. Ford

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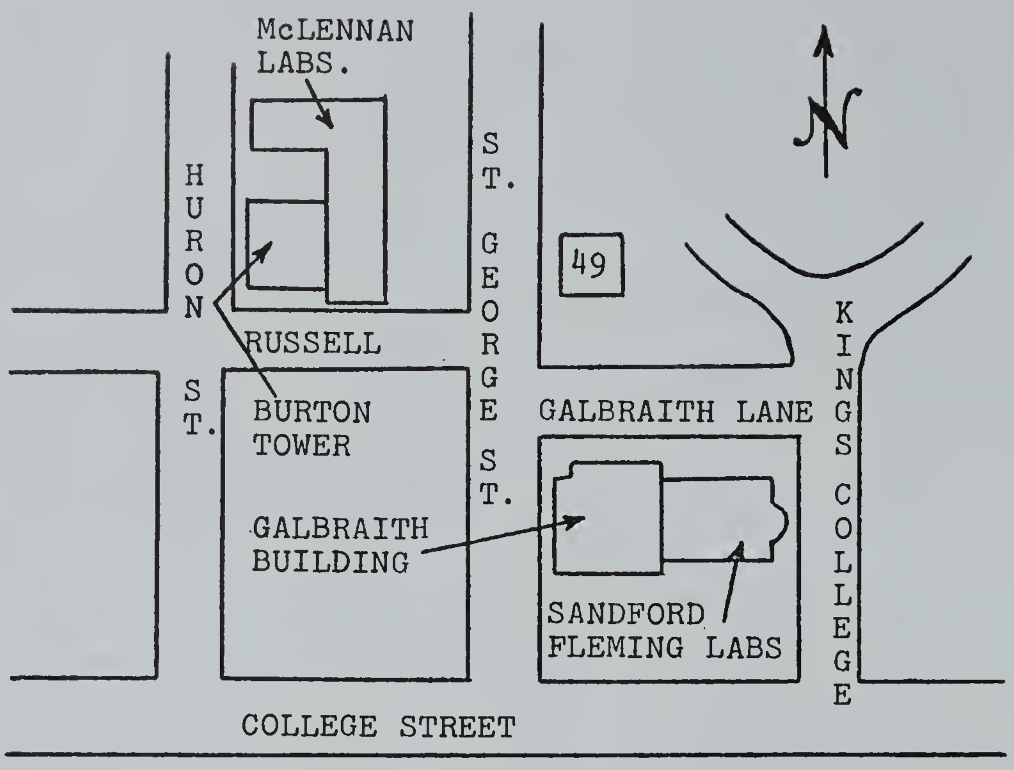
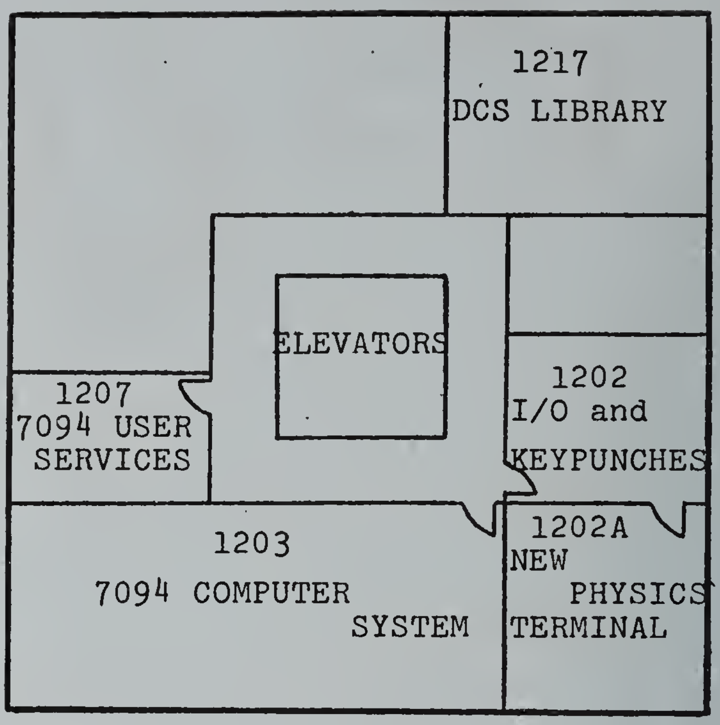
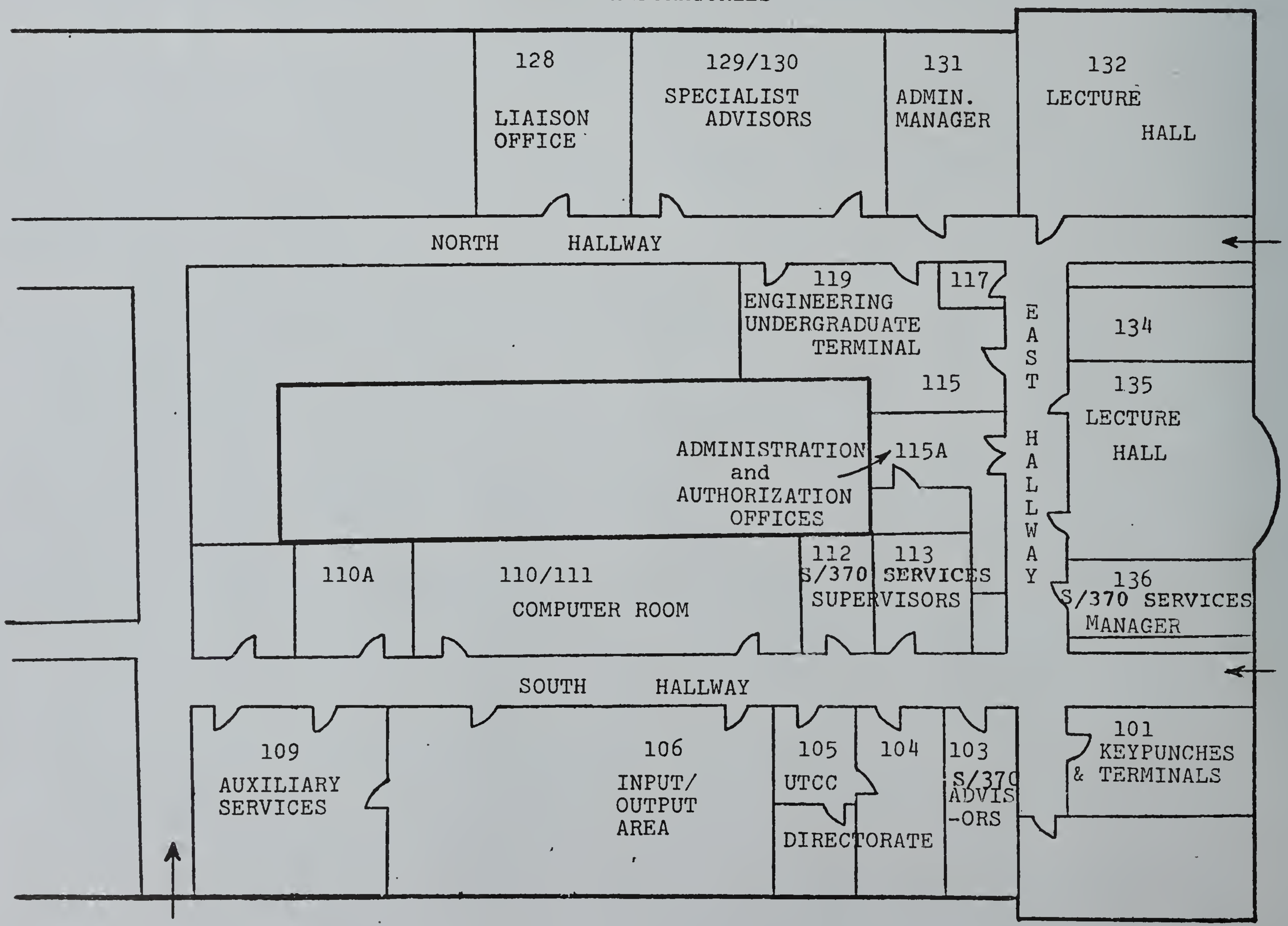




FLOOR PLAN: 12th FLOOR BURTON TOWER

FLOOR PLAN: UNIVERSITY OF TORONTO COMPUTER CENTRE
SANDFORD FLEMING LABORATORIES



SUGGESTIONS

Janet Marsh

The number of suggestions received this month increased to 44, as compared to only 30 last month. These suggestions are broken down into the following general categories: technical issues (13), Computer Centre policies (3), equipment and physical plant ideas (13), general job handling procedures (6), advising services (2), publications (1), and miscellaneous (6). Some of these are quoted and discussed below.

Suggestion: "Divide the output paper in half lengthwise and perforate it down the middle. This would allow two jobs to be printed simultaneously and should decrease the lineup during peak periods."

Reply: Two fundamental problems result: (1) allows for only 66 characters to be printed per line per job - not enough for most users; and (2) serious congestion would occur when users are tearing off jobs of different lengths from the printer.

Suggestion: "Downtime from 10:00 p.m. to midnight is very awkward for evening students. Midnight to 2:00 a.m. would be much better."

Reply: The reason for the system shutdown between 10:00 p.m. and midnight is to allow our Assurance and Development groups to test and/or implement new software packages. Moving this test time back to midnight would force these system programmers to break up their working day even more than at present and make working conditions much less suitable.

Suggestion: "Please put user's name on $JOBRL listings so that output may be identified more easily."

Reply: This change should be forthcoming shortly.

Suggestion: "A set of up-to-date IBM manuals be made available at the Arts and Science terminal."

Reply: We are in the process of updating these manuals.

Suggestion: "Keep the card sorter and 514 reproducer at the Arts and Science terminal."

Reply: These machines will be kept at the Arts and Science terminal until we have developed our software 'unit record' package to replace them.

THE NEWSLETTER: ITS SCOPE AND FORMAT

C. A. Ford

The Computer Centre, which has long been the publisher of the Computer Science Newsletter, was known until October of 1970 as the Institute of Computer Science. We were at that time given cause to consider either changing the name of the publication or expanding its scope by offering to print all computer news of possible interest to our users. The latter course was chosen, with a resultant increase in size and scope of recent issues.

The format changed to suit the broadening scope as well as changes in UTCC's approach to the provision of computer services. Since the advent of the System/370 - 165, the service areas have become more independent, owing largely to the segregation of the interactive systems onto a non-batching System/360-65. Production and quality statistics are completely separated into the individual service reports starting with this issue.

The Computer Research Facility (System/360-44, etc., J. McBride, Manager) had provided material published here as appendices in the past. It has been convenient to add a full service section for CRF last month and this.

We have moved well away from an earlier tendency to print material of the nature of technical documentation. The Centre operates other media for this purpose.

To all of our University of Toronto computer colleagues we repeat the invitation of Newsletter 70, November 1970; send us your news (but not your technical reference documentation) and we will do the rest.

PRICES FOR 1972/73

C. A. Ford

The Pricing Subcommittee of the Presidential Advisory Committee on Computer Policy and Planning has been reviewing the costs and production figures of the Computer Centre. The Subcommittee is recommending that the price list in effect since January 3, 1972 be continued into fiscal year 1972/73. Minor changes in the Auxiliary Service and Setup area may be made at the Centre's discretion.

The shortness of experience with the S/370-165 and the dedicated interactive S/360-65 is recognized. The production of the next few months is, therefore, slated for review towards mid-year.

A FUNNY THING HAPPENED....

J. C. Wilson

One computer looks much like any other. For this reason some computing scenes accompanying a commentary concerning the Harvard Medical Centre, on a March 29th CBC-TV show called "Two Arctic Tales", were shot at UTCC. The giveaway was the presence of two familiar UTCC faces, Sylvia May and Elvin Edwards.

PERSONNEL CHANGES

Jennifer Schick

New to the Computer Centre during the last month are Holly Taylor, Computer Operator for the Interactive Systems Group and Paula LoBello, secretary for the Liaison Office.

McKinley Esnard and Ian McNeil have terminated their employment as operators for the Centre. Also this month we have said good-bye to three of our Stenos, Vicki Bartolomeo, Brenda Haines and Pat Roach. Congratulations to Janet Campbell (nee Likeness) on her recent marriage.

CIPS SESSION '72

C. Phillips

The Canadian Computer Conference sponsored by the Canadian Information Processing Society will be held in Montreal June 1-3. Following is a list of speakers from the University of Toronto.

"Predicting Performance Changes in Systems"
J. Metzger

"The Structure of the Nucleus of an Operating System for System/360"
Ric Holt

"Measurement and Authorization in the SUE System"
K. Sevcik

"Hierarchical Input/Output Supervisor for the IBM System/360"
J. Atwood and M. Grushcow

"The Kernel of the SUE Operating System"
M. Grushcow

Denis Tsichritzis will chair the Invited Session on Software Engineering.

CIPS promises a strong international flavour as well as broad national representation.

The Canadian Computer Show will be held concurrently at Place Bonaventure, Montreal on May 30,31, and June 1.

NEWS FROM THE DEPARTMENT OF COMPUTER SCIENCE

C. Phillips

Undergraduate Handbook

The 1972-73 edition of the Computer Science undergraduate handbook (better known as the Cook Book in honour of our Undergraduate Secretary, Professor Steve Cook) is now available from Mrs. Margaret Chepely. It contains an outline of the Computer Science Specialist program and descriptions of courses offered by the department in the Arts and Science Faculty, in Engineering Science, and graduate courses open to fourth year students. A complete list of instructors for each course will be available as an addendum by the end of April.

Secondary School Teachers Symposia

"Games Computers Play" was the theme for the 2nd day-long symposium for those interested in high school teaching. About 75 persons attended; most were from the Toronto area, but there were many out of town visitors. The last Saturday session will be May 6, which will be a workshop. The problem for the day will be the simulation of the ecology of Wolf Island. Anyone interested in attending can register with Corley Phillips, 928-4058.

Computer Systems Research Group

CSRG was established in September 1968, under the joint administration of the Departments of Computer Science and Electrical Engineering. The major objectives of CSRG are to do research and development on the design and operating characteristics of complex computer systems, and to see that the results of these investigations are used to improve information processing in Canadian business and government, as well as in universities. Some of the early projects have been completed and new ones initiated. Many of the techniques developed have been published in the CSRG Technical Report Series, and in other publications, particularly IFIP Congress '71 which accepted six papers from CSRG members.

The two most recent Technical Reports are number 10: "How a Programming Language is Used", Gregg Alexander and number 11: "The Project Sue Status Report".

The current CSRG staff includes 18 faculty members, 35 student members, 9 programmers and 6 support staff. Since CSRG is not an academic division of the university, students are registered in a graduate department and are actively involved with a CSRG project.

More information about CSRG and the projects can be obtained from:

Professor E. S. Lee
Chairman, Computer Systems Research Group
Room 2715 Sandford Fleming Building
University of Toronto

Last Class for Year and a Half

Last week was the end of classes for Arts and Science undergraduates. Professor Les Mezei also had his last class as he begins a year and a half leave of absence this summer. Well known for his innovative work in the area of computer graphics, Les Mezei plans to spend his "free" time writing and thinking - in exotic Don Mills.

This fall his book "Computer Art" will be published by the New York Times in conjunction with Computers and Automation Magazine.

THE DEPARTMENT OF COMPUTER SCIENCE LIBRARY

Recent Acquisitions

ACM Conference on Proving Assertions About Programs, New Mexico State University, Jan. 1972.
  Proceedings.
New York, ACM, 1972.

Association for Computing Machinery. Joint User Group.
  Computer Programs Directory 1971.
New York, ACM Information Cor., 1971.

Bagdikian, Ben H.
  The Information Machines: Their Impact on Men and The Media.
New York, Harper & Row, 1971.

Beizer, Boris.
The Architecture and Engineering of Digital Computer Complexes.
New York, Plenum Press, 1971.

Bisco, Ralph L., ed.
Data Bases, Computers, and The Social Sciences.
New York, Wiley-Interscience, 1970.

Cadow, Harry W.
OS/360 Job Control Language.
Englewood Cliffs, N.J., Prentice-Hall, 1970.

Clark, Frank J.
Introduction to PL/I Programming.
Boston, Allyn and Bacon, 1971.

Conference on Data Systems Languages. Data Base Task Group.
Report.
New York, ACM, April 1971.

Conference on Interdisciplinary Research in Computer Science, Univ. of Manitoba, 1970.
Proceedings, ed. by M.G. Saunders and R.G. Stanton.

Conference on Picture Language Machines, Australian National University, 1969.
Picture Language Machines, ed. by S. Kaneff.
London, Academic Press, 1970.

Flores, Ivan.
Computer Programming System/360.
Englewood Cliffs, N.J., Prentice-Hall, 1971.

Flores, Ivan.
Job Control Language and File Definition.
Englewood Cliffs, N.J., Prentice-Hall, 1971.

Friedman, Joyce.
A Computer Model of Transformational Grammar.
New York, American Elsevier, 1971.

Gastinel, Noel.
Linear Numerical Analysis.
Paris, Hermann, 1970.

Gear, C.W.
Numerical Initial Value Problems in Ordinary Differential Equations.
Englewood Cliffs, N.J., Prentice-Hall, 1971.

Gruenberger, Fred, ed.
Expanding Use of Computers in the 70's: Markets, Needs, Technology.
Englewood Cliffs, N.J., Prentice-Hall, 1971.

International Joint Conference on Artificial Intelligence, 1st, Washington, D.C., 1969.
Prodeedings, ed. by D.E. Walker and L.M. Norton.

IFIP Working Conference on ALGOL 68 Implementation, Munich, 1970.
ALGOL 68 Implementation, ed. by J.E.L. Peck.
Amsterdam, North-Holland, 1971.

International IFIP/IFAC PROLAMAT Conference, 1st, Rome, 1969.
Numerical Control Programming Languages, ed. by W.H. P. Leslie.
Amsterdam, North-Holland, 1970.

International Symposium on Automation of Population Register Systems Jerusale, 1967.
Proceedings, 2v.

Kanwal, Ram P.
Linear Integral Equations: Theory and Technique.
New York, Academic Press, 1971.

Katzan, Harry.
APL User's Guide.
New York, Van Nostrand Reinhold, 1971.

Louisiana Conference on Combinatorics, Graph Theory, and Computer Science, 1st, Louisiana State University, Baton Rouge, 1970.
Proceedings, ed. by R.C. Mullin, K.B. Reid and D.P. Rosell.

McNaughton, Robert.
Counter-free Automata, by R. McNaughton and S. Papert.
Cambridge, Mass., M.I.T. Press, 1971.

Moursund, David G.
Problem Analysis and Solution Using FORTRAN IV.
Belmont, Cal., Wadsworth Pub. Co., 1970.

New Literature on Automation, editors.
Computers and Education: An International Bibliography.
New York, Science Associates, 1970.

Prager, William.
An Introduction to APL.
Boston, Allyn and Bacon, 1971.

Sackman, Harold.
Man-computer Problem Solving: Experimental Evaluation of Time-sharing and Batch Processing.
Princeton, N.J., Auerbach, 1970.

Steinhart, R.F.
Programming the IBM System/360.
New York, Holt, Reinhart and Winston, 1970.

Stolyar, Abram Aronovich.
Introduction to Elementary Mathematical Logic.
Cambridge, Mass., M.I.T. Press, 1970.

Warner, Malcolm.
The Data Bank Society: Organizations, Computers and Social Freedom.
London, Allen & Unwin, 1970.

Weinberg, G.M.
The Psychology of Computer Programming.
New York, van Nostrand Reinhold, 1971.

JOB VOLUME FOR THE SYSTEM/370

C. A. Ford

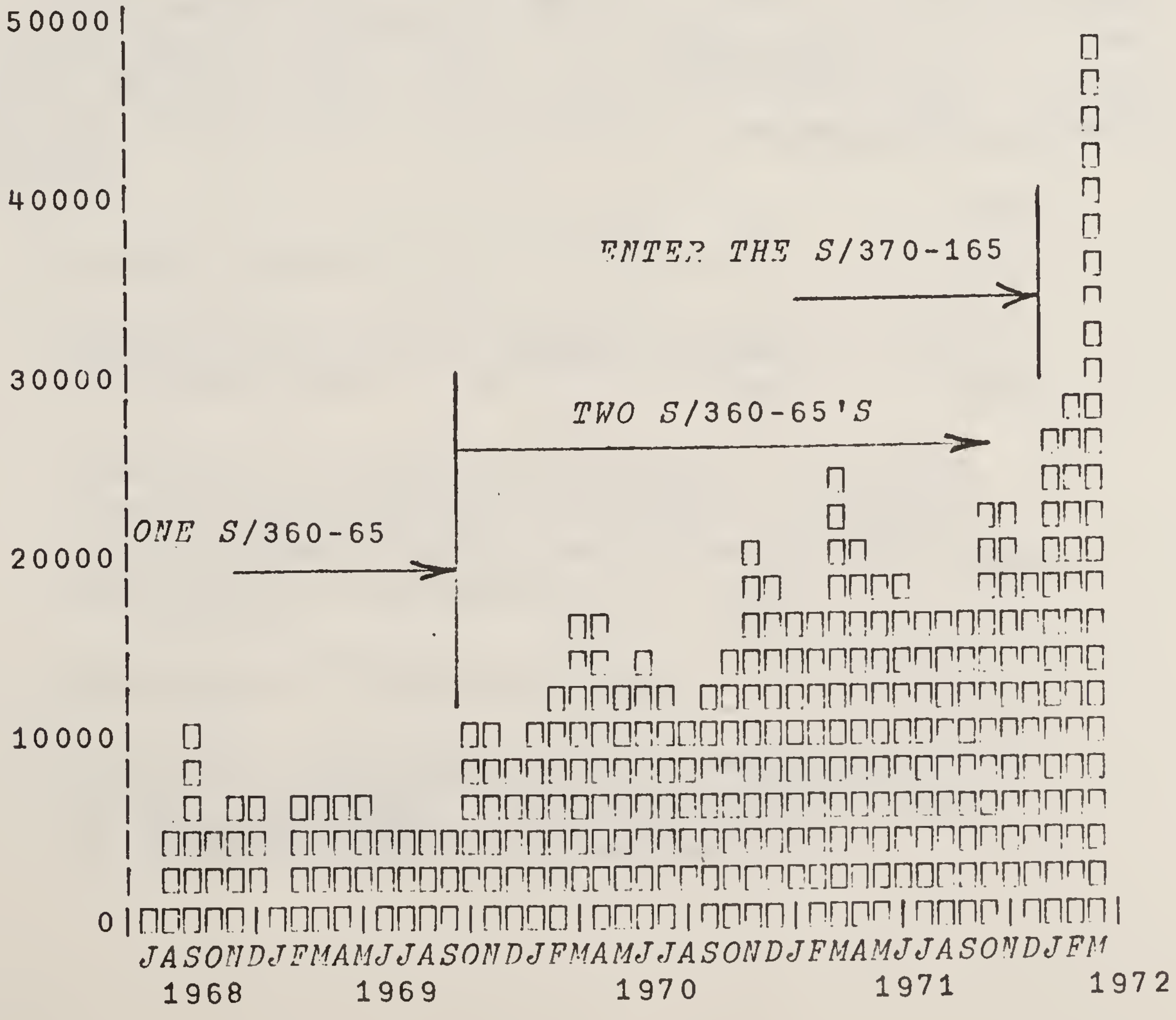
The new System/370-165 computer has continued to provide increasing levels of service since its installation late last year. A total of 48,358 general purpose jobs were run in March, more than double the number of March 1972. And beyond this was the High Speed load of 112,242 jobs, for a total of 160,600.

The S/3X0 histogram of jobs per month, below, illustrates the complete recorded history of U of T System/360 and System/370 general purpose job volume.

The March 1972 volume included a very heavy load of relatively short jobs associated with a number of undergraduate and graduate courses. Some of this load may be diverted to the High Speed Job Stream before another student season arrives.

The Overall Service Factor graphs, Figs. I, II and III, show a peaking-out of jobs per hour and a slight tendency towards higher priority choices. Although there appears to be a saturation level of about 130 jobs per hour, a substantial reserve of CPU time remains. More longer jobs and, later in the year, faster channels and disk storage will permit increases in CPU use and in the jobs-per hour index. (Overall Service Factor equals aggregate charges for a week's production, priority factor included, divided by the charges computed as if all were at PR=6.)

S/3X0 JOBS PER MONTH



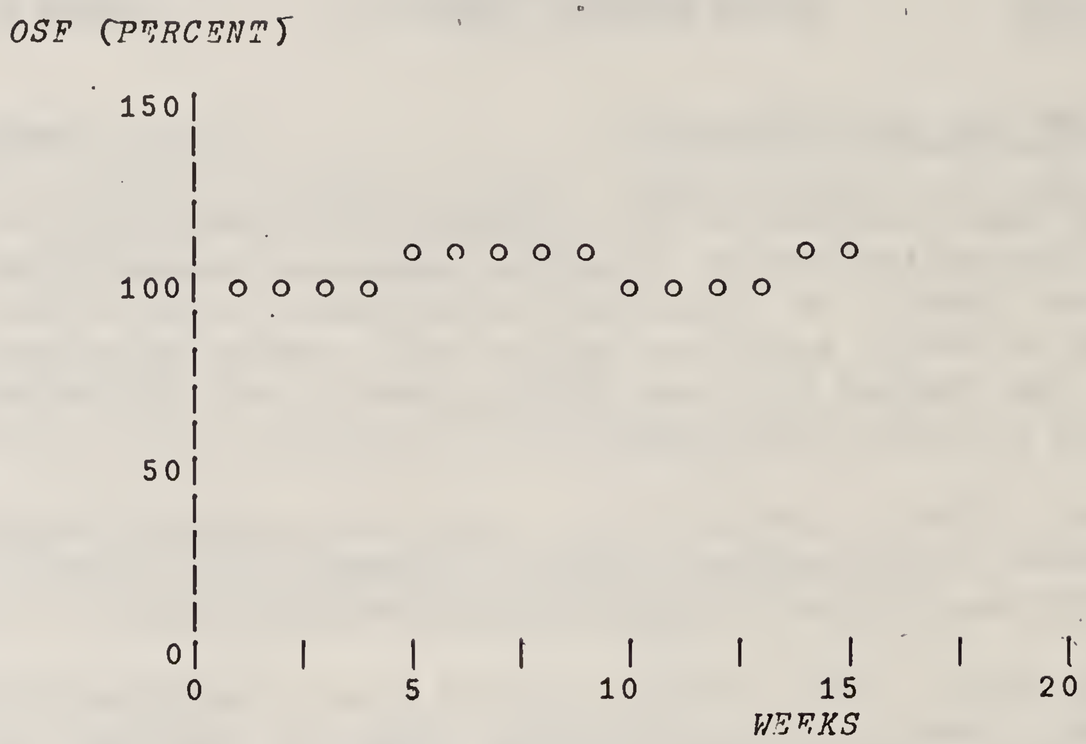


FIGURE I

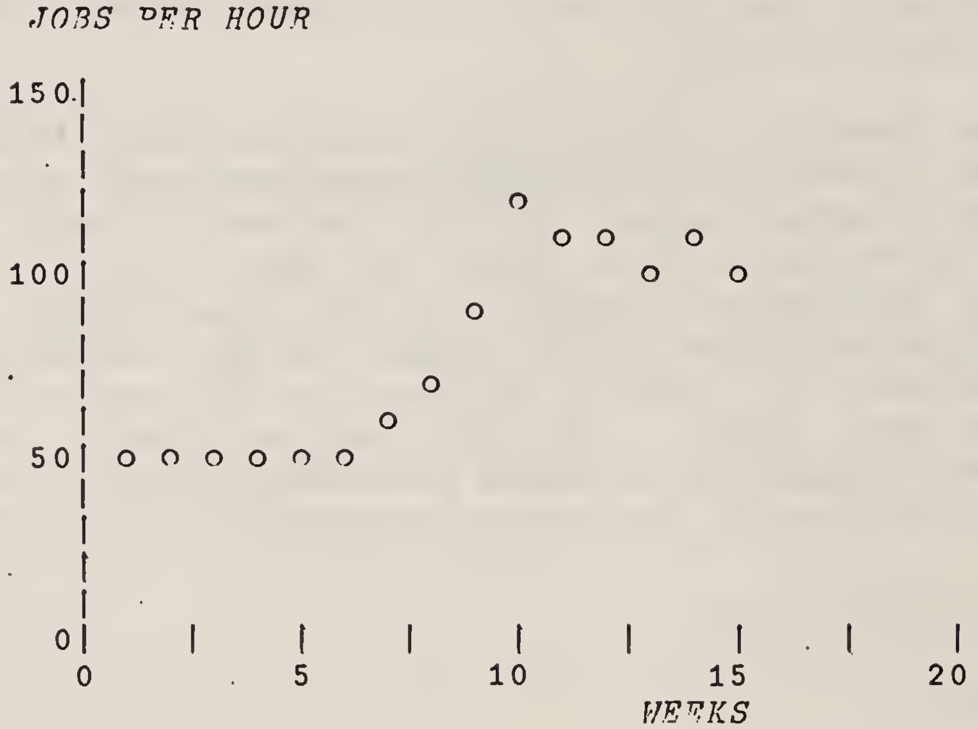


FIGURE II

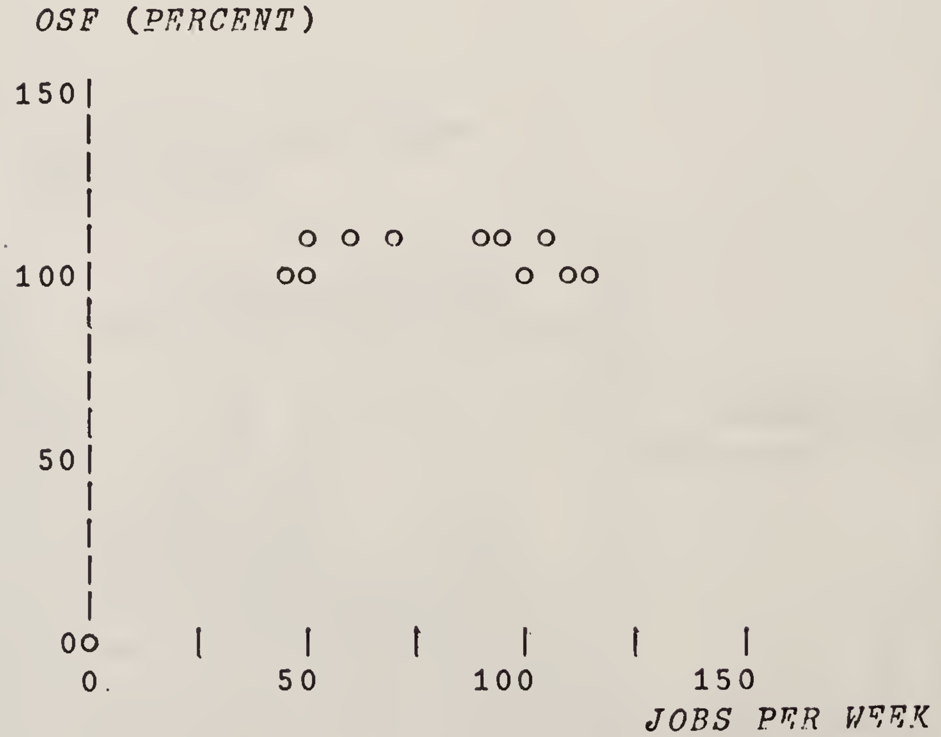


FIGURE III

SYSTEM RELIABILITY REPORT

R. Finlayson

The system reliability for the month of March on the System/370 is shown in the following table. The figures for February are shown for comparison.

	MONTH	UPTIME	MTBF
Local and remote	FEB	95.7%	5.1 hrs.
GPJS	MARCH	96.6%	9.3 hrs.

Both uptime and MTBF improved from the previous month. Main cause of downtime during the month was hardware errors on the channels.

HARDMON II: UTCC HARDWARE MONITOR

Gerard Milandre

HARDMON II, a system measurement device designed and built by UTCC staff, is proving to be a valuable computer performance measurement tool. It is permanently connected through its interface to the computer circuits, in order to monitor digital signals characteristic of specific functions, without interfering in any way with the computer system operation.

Measurements are made in terms of average activity of computer system components as a percentage of elapsed time, or in terms of a number of events occuring within a measured period of time. (Typical measurements would be the percentage of CPU activity or the number of seeks on a disk pack module per unit of time).

Any component of the computer system can be connected to the hardware monitor and its activity analyzed in terms of its relationship with the other components (i.e., channel activity overlap or CPU wait overlap with seeking activity).

The main features of the device are:

- facility for monitoring CPU activity in each protection key,
- facility for monitoring accesses to given areas of main storage (originally designed for the System/360-65 and presently being modified for the System/370 - 165),
- counting and timing facility,
- facility for displaying simultaneously on a chart recorder, the variations of average activity of eight discrete functions.

The hardware monitor (especially when complemented with software system monitors) helps rationalize system tuning and optimize operation.

ON OVERLAPPING CPU AND I/O ACTIVITIES

C. A. Ford

A user at an American university recently petitioned his local computer centre to change the method for computing wait time. He argued that their method, depending upon a count of EXCPs (execute-channel-program instructions), carried no benefit to the skilful programmer who would normally arrange for CPU execution to overlap the I/O activity in his jobs.

We had been surprised and slightly embarrassed to find that programs converted from the System/360-65 to the System/370-165 showed somewhat more I/O wait time on the faster machine. This owed, we discovered, to the fact that our WAIT TIME algorithm did in fact perform in the manner recommended by the user quoted above.

Our embarrassed surprise of last year, reported in our Newsletter #83, December 1971, has turned to a flush of modest pleasure at having been purveying the more acceptable WAIT TIME measure for lo these many moons!

SPEC AND UTCC JOB FORMS

Don Gibson

Some of our users seem to be confused as to the use of "SPEC" and "UTCC Job Forms". We remind you that the Job Forms are to be used with CLASS C jobs only, and every CLASS C job must be accompanied by one. "SPEC" is to be used with any job sending a message to the operator. "SPEC" is used with mount classes to identify tapes with different internal and external labels and for indicating if a tape is to be mounted write-enabled. Instructions for "SPEC" may be obtained in the local I/O area (Room 106 Sandford Fleming Laboratories).

SYSTEM/370 APPLICATION SOFTWARE SUPPORT

William Hayes

The major activity currently being undertaken involves the inclusion of all engineering-related applications software in a single library encompassing data sets for load modules, source modules, test problems, and complete user documentation. As currently envisioned, the components of this library will be classified under the following headings:

- A. Mathematical Programming
- B. Discrete Simulation
- C. Continuous Simulation
- D. Classical Optimization
- E. Gradient Methods
- F. Other

The library contents will be stored on direct access storage devices and will be accessible to any user of the General Purpose Job Stream. A preliminary table of contents can be obtained by running the following CLASS B job:

```
//         EXEC  RETRIEVE
//RETR.DATASET DD DSN=IC.ENGLIBD,DISP=SHR
//RETR.SYSIN   DD *
           PRINT   MEMBER=CONTENTS
/*
//
```

STATISTICS ON CATALOGUED PROCEDURE USAGE

Ian Darwin

Two procedures, SPITBOL and FORTCALG, showed very heavy usage for this month. This is attributable to course activity (Computer Science and Computer Graphics courses) during this school term. The most heavily used procedures for the period of March 7 through April 11 are as follows:

Procedure Usage

Procedure	Number of Jobs	Percentage
SPITBOL	7651	28.25%
FORTGCLG	5160	19.15%
FORTCALG	4136	15.27%
SPSS	1512	5.58%
FORTGLDG	1330	4.91%
BMD	1262	4.66%
FORSLDG	1233	4.55%
PL1LLDGO	1147	4.24%
PL1LFCLG	625	2.31%
ASMFCLG	422	1.56%
OTHERS	2601	9.61%
	27079	100.0 %

A number of observations can be drawn from the available statistics, notably:

Total FORTRAN	13097
Total PL/I	2004
Total Assembler	919
Total Erroneous Counts	713

Ratio of PL/I Load & Go to PL1 CLG = 1.61

Ratio of FORTRAN CLG to Load & Go = 4.17

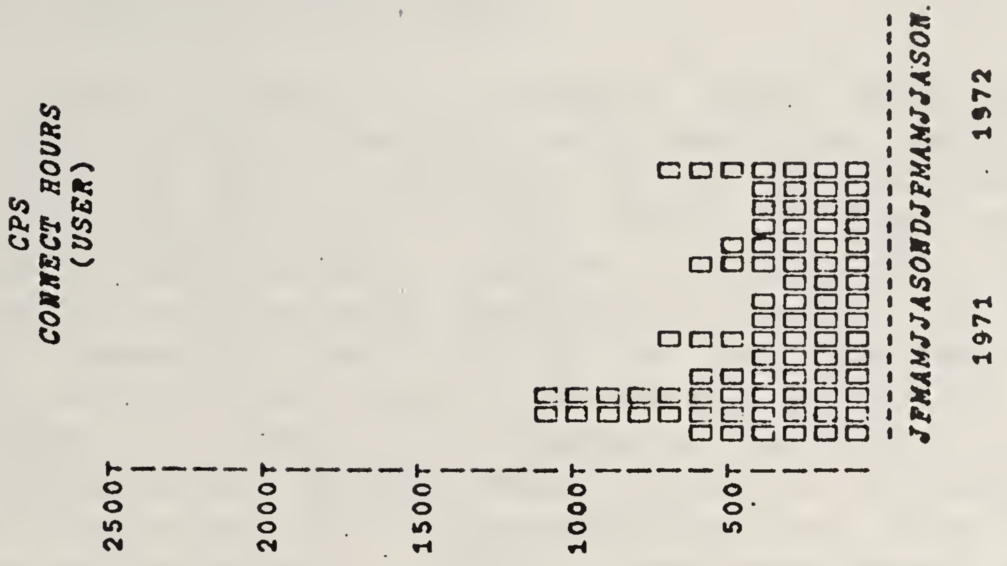
These data have been valuable indicators to system tuning and project planning. They are, however, gathered by means of otherwise unnecessary job steps initiated by calls upon the procedures. It is intended to implement a counting process in the future which will be transparent to the users.

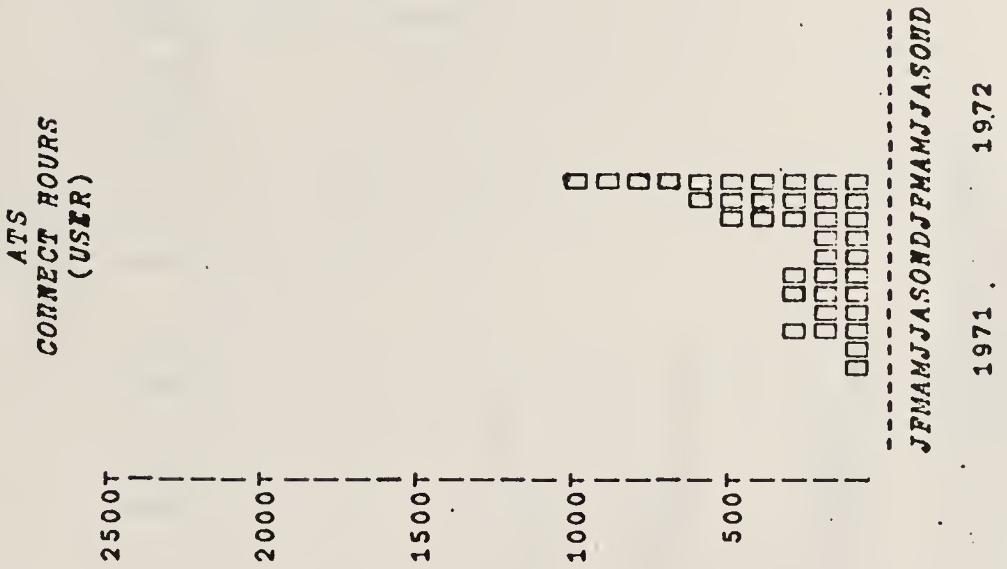
These indicators of language preferences are, we hope, of interest also to the planners of computer science activities here and elsewhere. We shall attempt, therefore, to present these data with some degree of continuity.

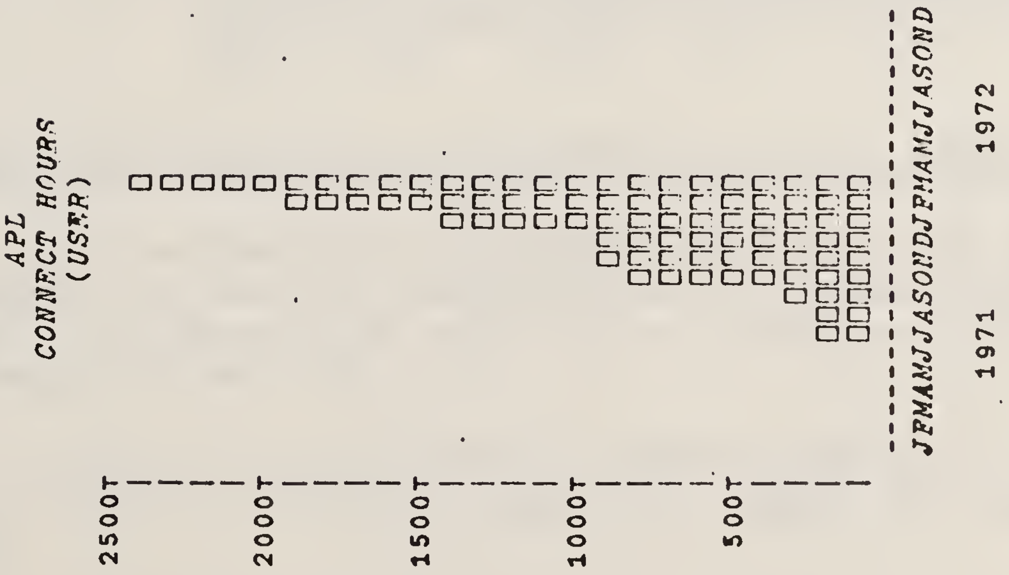
SYSTEM STATUS BULLETINS ISSUED

Janet Marsh

17:72:1	General Purpose Simulation System
18:72:1	CRJE Line Problems
19:72:1	Continued Availability of OS Release 18.6 Processors
20:72:1	CRJE Demonstrations
20:72:2	PL/I Intermediate Lecture Series
21:72:1	New Minimum Region Size
22:72:1	Hours of Service - Easter Weekend
22:72:2	Withdrawal of TIC008 (CPS/RJE Libraries and Data Sets)
23:72:1	User Oriented Utilities
23:72:2	WAT565K Procedure Renamed
23:72:3	WATFOR and SPITBOL 2.1


CPS
CONNECT HOURS
(USER)
2500
2000
1500
1000
500
JFMAMJJASONDJFMAMJJASON
1971
1972

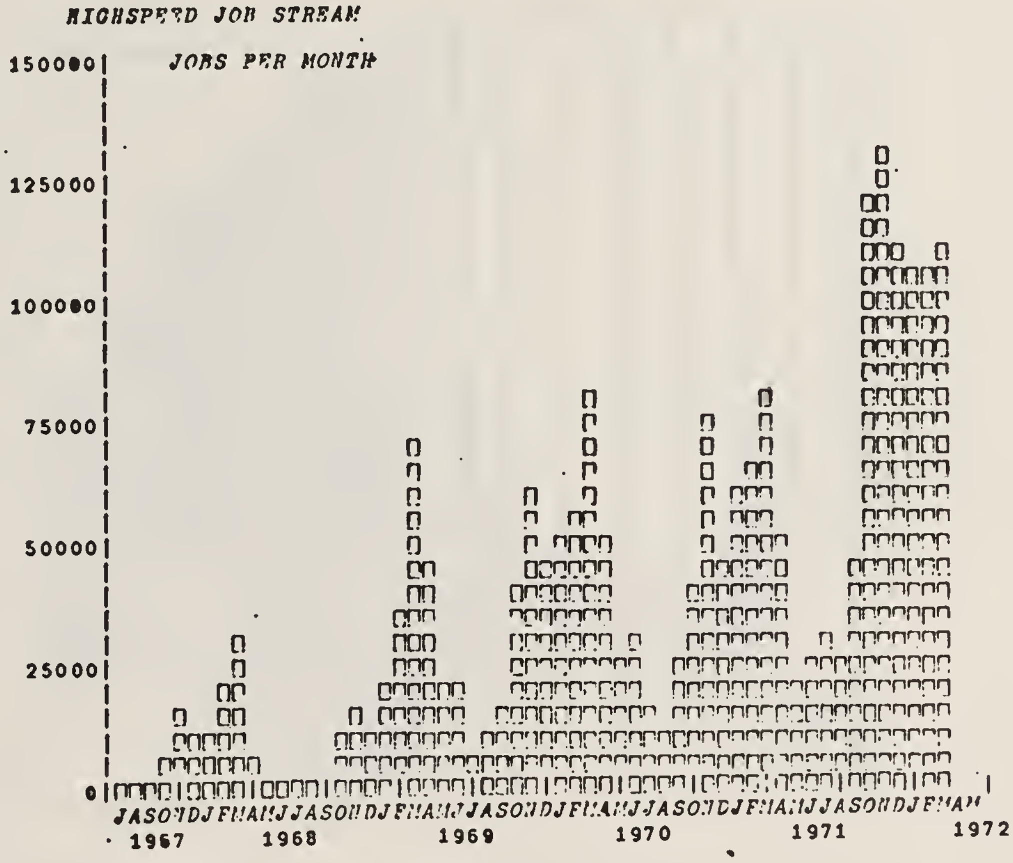

ATS
CONNECT HOURS
(USER)
2500
2000
1500
1000
500
JFMAMJJASONDJFMAMJJASOND
1971
1972


APL
CONNECT HOURS
(USER)
2500
2000
1500
1000
500
JFMAMJJASONDJFMAMJJASOND
1971
1972

HIGH SPEED JOB STREAM GROWTH

C. A. Ford

The accompanying histogram shows HSJS production history, as job volume per month, since the beginnings of service in 1967. The period of Oct. 1971/Mar.1972 can be seen as markedly more active than the same period of 1970/71. Surprisingly, however, is the fact that the activity in the current academic year peaked in November. This owes at least partly to the development of a substantial student load on the general System/370 stream, through an upsurge of interest in one or more processing languages (e.g., SPITBOL) which are yet to be included into the HSJS repertoire. (Programming project plans have been adjusted accordingly!) Also, computer-oriented half-term courses were scheduled more evenly this year between the terms.



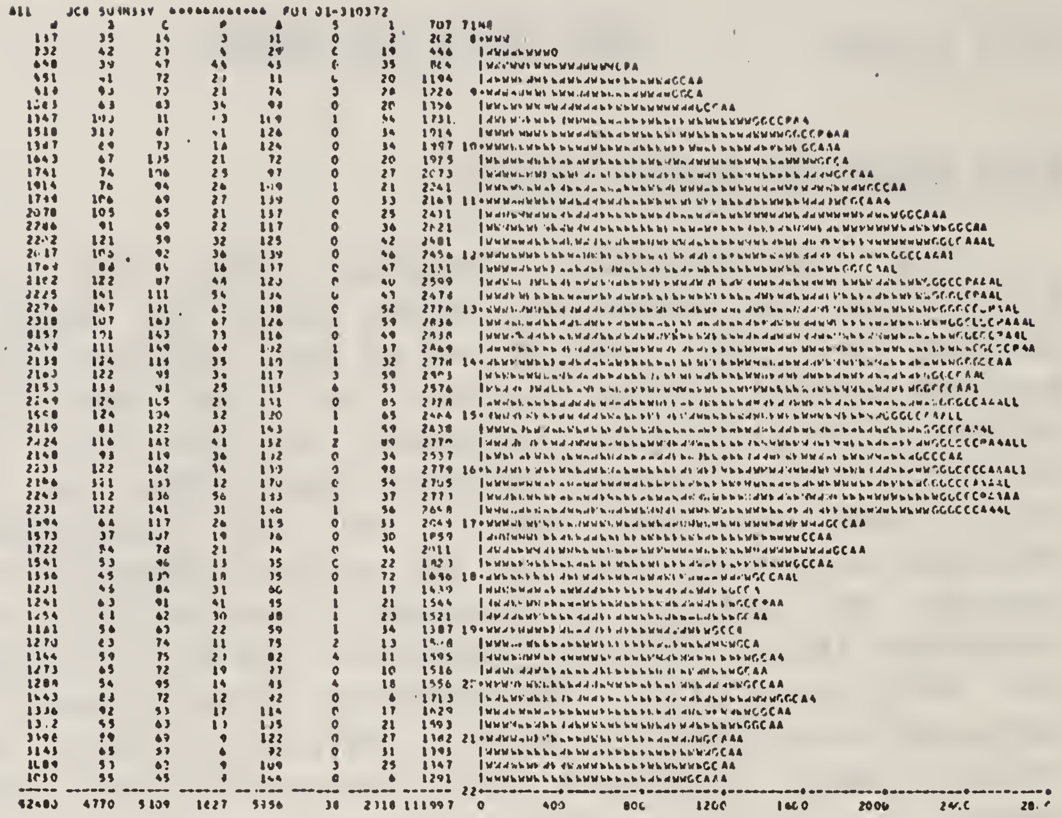
PRODUCTION STATISTICS FOR THE HIGH SPEED JOB STREAM

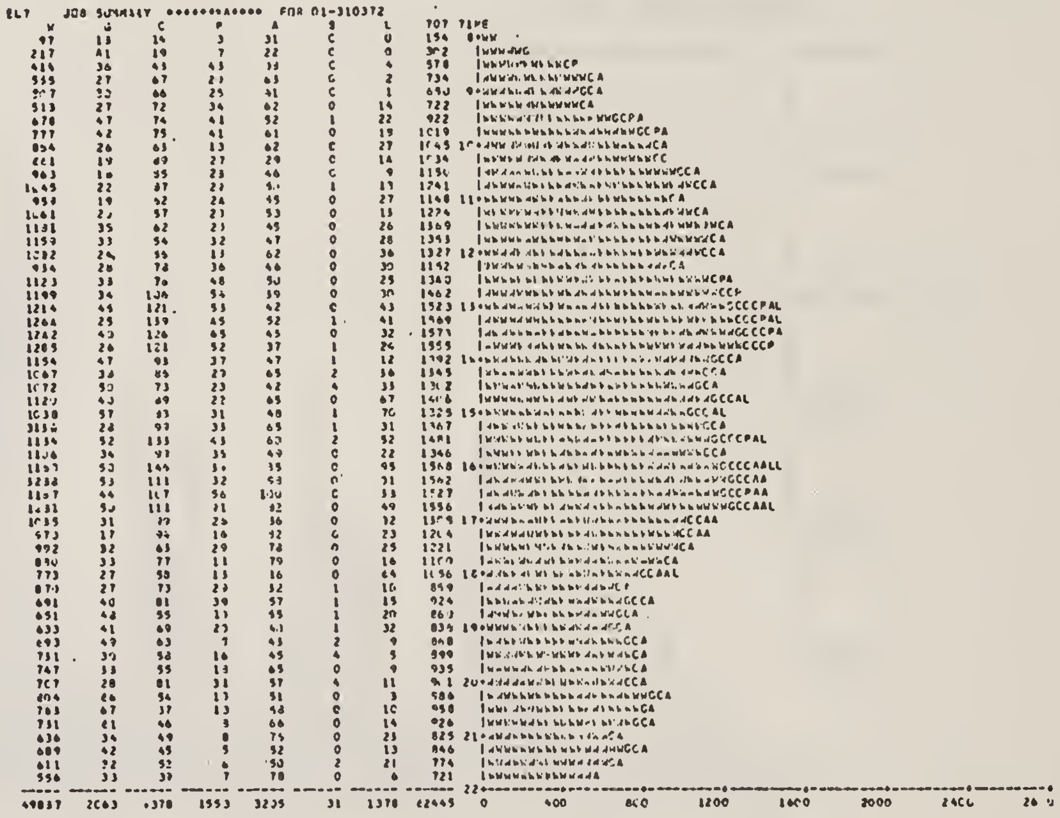
J. Lees

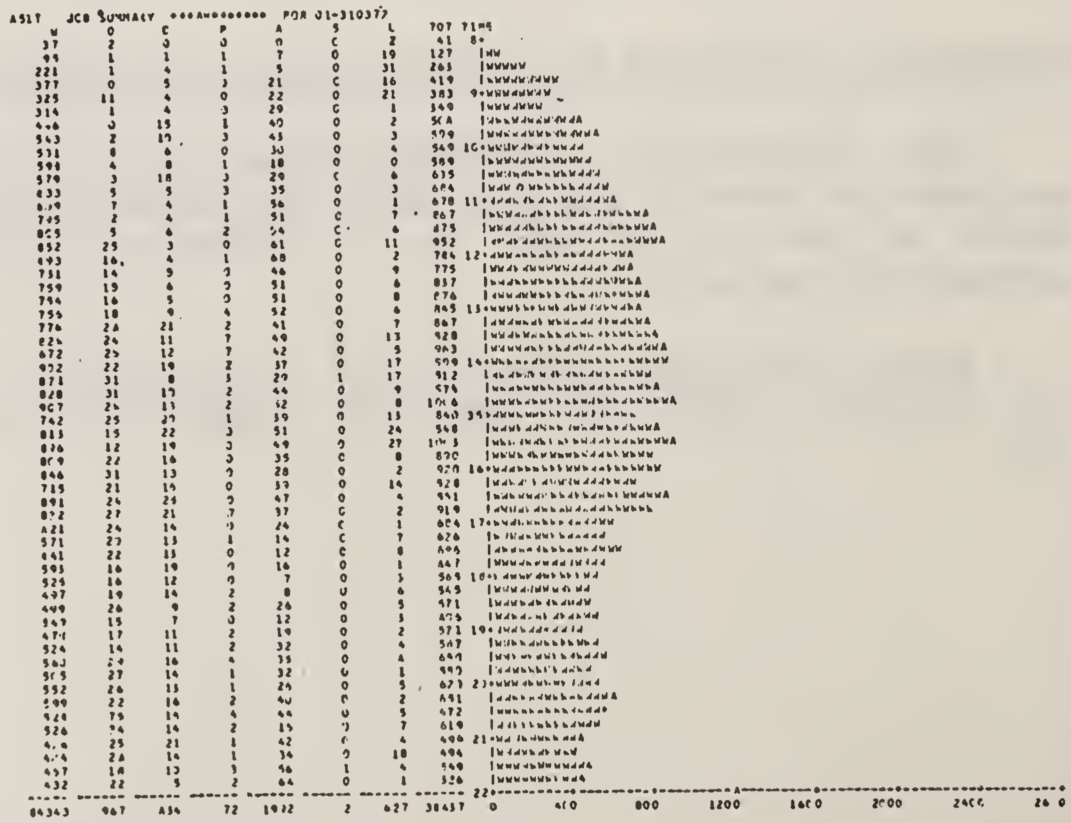
The accompanying histograms show the total number of programs run through the High Speed Job Stream during the month of March, as well as a breakdown of those jobs between EUT and ASUT.

Recall that the types of jobs are WATFIV (W), ALGOL W (G), PL/C (C), PLUTO (P), ASMG (A), SIMON (S), and LIST (L).

HIGH SPEED JOB STREAM







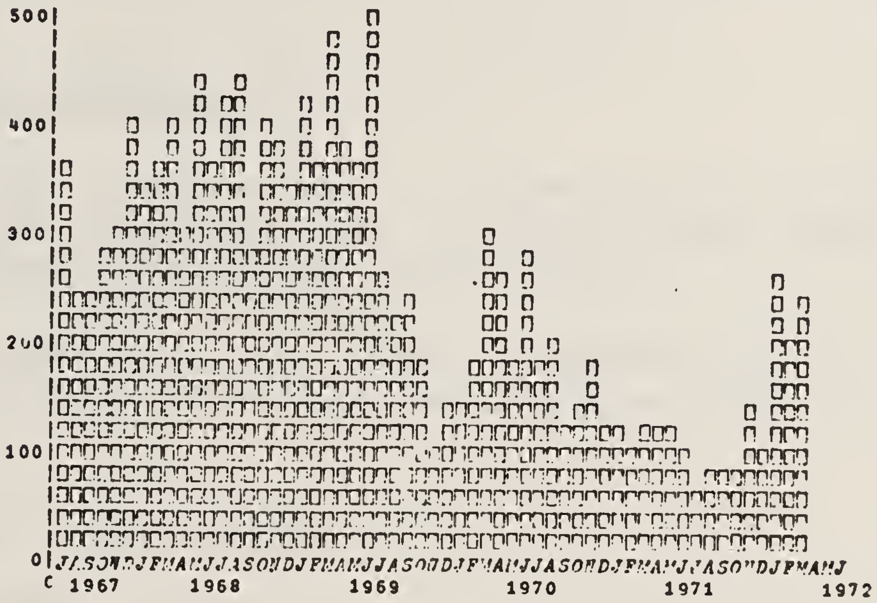
CONSORTIUM REJUVENATES THE 7094

J. V. Walton

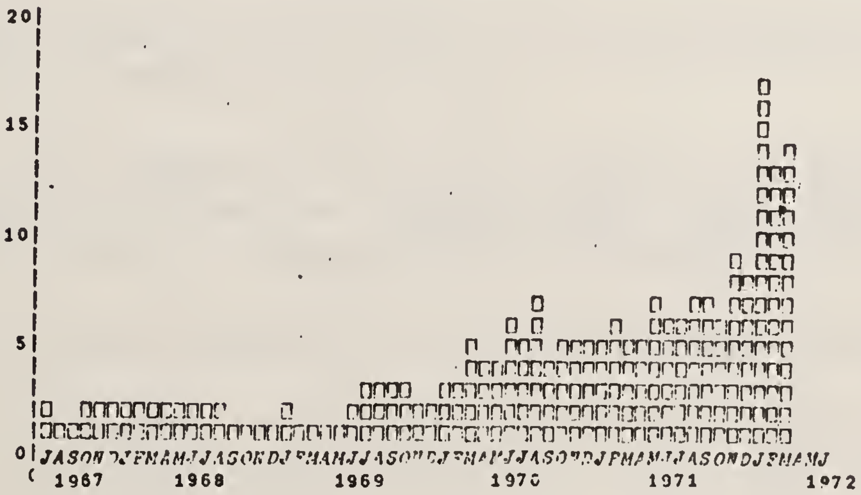
The accompanying history plots show that the 7094 volume of work has returned to viable levels. Furthermore, the type of job now being run is that best suited to the second-generation "number-cruncher". Because of the number of really long jobs, (two or three hours), being run, the average job time has gone up to about fifteen minutes, so that processing in sequential batches with off-line input/output is a practical proposition.

The three months from January to March of this year show an increase of 133% for 7094 CPU time over the previous three months. And this has been achieved with virtually no change in scheduling, expenses, or level of service.

7094 CPU HOURS



7094 CPU MINUTES PER JOB



GENERAL NEWS

J. R. McBride

Changes to Hours of Operation

In order to standardize the operating schedule in the evening, the dinner break for the CRF operator has now been fixed at 6:00 p.m. This means that the lab will be closed each evening from 6:00 p.m. to 7:00 p.m. However, the lab will be available to Grade 'A' operators during that time.

The new operating schedule will therefore be as follows:

HOURS OF OPERATION

Monday to Friday	9:00 a.m. to 6:00 p.m. 7:00 p.m. to midnight
Saturdays, Sundays and Holidays	closed (Available to Grade 'A' operators only)

OS MFT II Release 20.6

The introduction of Release 20.6 on March 21st went smoothly. Relatively few problems were experienced, and these were quickly and easily fixed.

Experience to date suggests that 20.6 is a considerable improvement over Release 20.0.

CALCOMP User's Guide

CRF's CALCOMP User's Guide is now available on our documentation pack, and may be obtained under the name CALCOMP using the normal documentation procedure.

```
(// EXEC LDOC,NAME=CALCOMP)
```

Non-CRF users may obtain a copy from Ken Weir, Room 2740 Sandford Fleming Laboratories.

The CALCOMP routines now support the IBM 2250 display device as well as the CALCOMP 835 Microfilm Plotter. A useful method of debugging plot programs.

The 2250 support was written by Marc Joliat of CSRG.

NOTE: Although the 2250 support routines are used mainly for Microfilm simulation at CRF, they also support

PEN PLOT calls with a very minor change to the user's program.

Visitors to the Lab

In the month of March the following people visited the CRF lab: Prof. D. Bonyun (Acadia University); Prof. R. Powell (University of California, Berkeley); Prof. N. Minsky (University of Minnesota); Prof. C. Strauss (Brown University); Prof. H. Cohen (University of California, San Diego); Mr. N. Marcotty (GM Research Lab, Michigan).

CRF'S PROCEDURE LIBRARY (PROCLIB)

J. R. McBride

On the average about 75% of the jobs run at CRF use catalogued procedures. In the past four week period the figure was close to 80%. For this reason CRF considers catalogued procedures as one of the more important parts of the operating system.

CRF has spent some time recently adding new procedures and tuning old procedures to make them more efficient. The effect of this should be to make running programs simpler and cheaper for users, and eliminate many user JCL errors. We feel that we now have a good PROCLIB but there are probably many more improvements that could be made. In that respect you can help us by passing on your suggestions.

The current usage of the procedure library is as follows:

PROCLIB

Top Ten Procedures for past three weeks from March 14 to April 3, 1972.

PROCEDURE	% OF TOTAL USAGE
TAPE	21%
DISMLG	21%
FORTGCLG	11%
FORMAT	9%
COMPRESS	8%
ARTA	7%
ASMFCL	6%
SUPERZAP	6%
XPLCG	5%
LISTVTOC	5%

TECHNICAL TIPS

J. R. McBride

Technical tips contributed by CRF staff and users appear regularly in the CRF Information Bulletin. The following tip was submitted by D. R. Smith of CRF and may be of interest to computer users in general.

(A publication containing all CRF Technical Tips for 1971 is available from Miss Joyce King (6326) in Room SF2740).

Tip #4:DATE and TIME Calculations

In order to standardize date and time calculations, a general date/time routine has been added to CRF's library of programs. This routine may be called from Assembler, FORTRAN, COBOL and PL/I
There are two calling sequences:

```
CALL DATEW(IYEAR,IDYEAR,ICHAR)
CALL DATEW(IYEAR,IDYEAR,IDWEEK,IDMNTH ,H,M,H ,H,M,S)
```

All values except "ICHAR" are:

INTEGER*4	for FORTRAN
FIXED BINARY (31,0)	for PL/I
01 COMPUTATIONAL S9(18)	for COBOL
FULL WORD BINARY	for Assembler

"ICHAR" is :

8 element INTEGER*4 array	for FORTRAN
CHARACTER (32)	for PL/I
PICTURE X(32)	for COBOL
32 BYTE DATA AREA	for Assembler

IYEAR - is the year of the date for which the expanded date is desired. If this value is between 1 and 50, then the year is 2001 to 2050. If between 51 and 99 the year is 1951 to 1999. If the value is greater than 99, then it is assumed that this is the actual year.

IDYEAR - is the day of the year for which the expanded date is desired, or zero if the current date is desired. If zero is specified for both IYEAR and IDYEAR, then the current year and day are returned in these variables.

ICHAR - is returned as a 32 byte character string of the following form:

```
'DDDDbMMMMbDD,bYYYYbbbHH:MM:SSbb'
'THURbSEPTbb7,b1972bbbb03:45:18  '
```

IDWEEK - is returned as a number between 1 and 7, representing the day of the week starting at Sunday.

MONTH - is returned as a number between 1 and 12 representing the month of the year.

IDMNTH - is returned as a number representing the day of the month between 1 and 31.

H,M,S - are returned as the numeric hours, minutes and seconds. (current time)

NOTES:

(1) If DATEW is to be called from PL/I, then the following statement must appear once prior to the first call to DATEW:

```
CALL CRFPL1
```

(2) DATEW should produce accurate dates up to the year 99,999, and back to the year 100 (back calculated on the GREGORIAN calendar).

This date routine is being used for ALL date calculations at CRF, and it is suggested that CRF users use it whenever possible.

Copies of the deck may be obtained from Ken Weir, Room 2740, for users desiring to transport source decks/tapes outside of CRF.

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- -

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UTCC COMPUTER EQUIPMENT

(a) SYSTEM/370 MODEL 165

- located in SF 106/110/111
- provides General Purpose Job Stream and High Speed Job Stream services
- 2048K bytes of core
- 16 disk drives
- 1 drum
- 6 magnetic tape drives (4 9-track and 2 7-track)
- 6 display consoles
- 5 printers
- 4 card readers
- 2 card punches
- 6 remote terminals
- 1 paper tape reader

- OS/MVT with HASP

(b) SYSTEM/360 MODEL 65

- located in Room 333 McLennan Physical Laboratories
- provides Interactive Systems service
- 1536K bytes of core
- 8 disk drives
- 2 9-track magnetic tape drives
- 1 printer
- 1 card reader
- 1 card punch
- 70 2741 typewriter terminals

- OS/MVT with CPS, ATS, and APL

(c) 7094 II

- located in Room 1203 Burton Tower
- 32K words of core
- 1 disk
- 8 magnetic tape drives
- input/output via a 1401 computer

UTCC AUXILIARY EQUIPMENT

- located in SF Room 109
- System/360 Model 20 for unit record services
- CALCOMP plotter (11" and 30")
- card sorter
- decollator
- 519 reproducing punch

UNIVERSITY OF TORONTO
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